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THESIS

**INSIDER INFORMATION TRADING ANALYSIS
OF DEFENSE COMPANIES PRIOR TO
MAJOR CONTRACT AWARDS**

by

Richard David Alexander

December 1993

Co-Advisors:

Patrick Parker
Thomas H. Hoivik

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by

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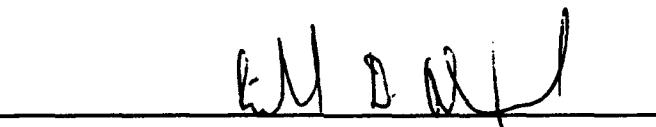
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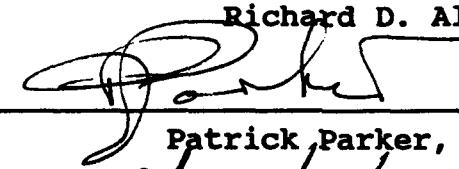
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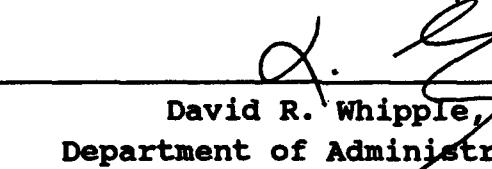

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ABSTRACT

The purpose of the thesis is to examine government contractor stock activity prior to contract award announcements to determine if insider inequalities may have occurred. The thesis examines four defense industry companies to determine if insiders trade on non-public information to earn above average returns based on contract awards. Stock price data for the 30 days leading up to the award was closely scrutinized. The Capital Asset Pricing Model was used to calculate possible abnormal returns. The analysis included reviewing registered insider transactions, related company stock movement and earnings announcements. All available news data was also analyzed to provide background and any causal relationships to any abnormality. The results from the companies analyzed in this thesis provide support to the semi-strong form of the efficient market hypothesis. In two of the companies no abnormal returns were found in the 30 days leading up to the contract award. The abnormal returns of the other two companies appeared related to a surprise positive earnings announcement and a strong sector rally rather than directly to the contract award.

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I. INTRODUCTION

A. PURPOSE

The purpose of this thesis is to examine government contractor stock trading activity prior to contract award announcements to determine if insider information inequalities may have occurred. When irregularity is identified the thesis will examine possible causes for the abnormal behavior. The methodology provided in the thesis may provide a basis for future SEC or Department of Defense investigations into possible illegal insider trading patterns within the defense industries.

B. BACKGROUND

Defense contract awards are often very lucrative and very important to a defense firm's future profits. Therefore, information on pending contract awards can be very valuable. Individuals possessing award information prior to its public release may be tempted to use it if the opportunity presents itself.

Through stock trading patterns the thesis will identify possible abnormal returns and trading irregularities prior to the contract award announcements. It might be expected that insiders could illegally purchase or sell stock prior to the announcement of a very favorable contract award. A previous study illustrated that an ever increasing volatility and

appreciation on the stock of a major aerospace company occurred as a major contract award for aircraft went through the various congressional sub-committees. This increased activity appeared to be the result of information leakage about the pending contract award. (Interview, Parker, 1992)

Analysis of the trading prior to the release of contract award announcements, may suggest the location of leaks in the information channel. Today the rules for announcing contract awards are specifically spelled out and strictly enforced. (Czech, 1989, p. 3) Some of the more important rules and regulations include the following:

1. The contract announcement is sent from the contracting agency to the Congressional Liaison Office;
2. Publication of this announcement is processed through the Public Affairs Office at the Pentagon and;
3. The contract award is announced at 4:00 p.m. Eastern Standard Time (EST) to coincide with the close of the New York Stock Exchange for that day. (Code of Federal Regulations, 5303(a), p. 51)

The timeframe for this process is often unique to the contract, but generally happens within a three day window. Abnormal price change prior to these announcements may provide evidence of insider information being used.

Considerable research has been done to determine the extent of insider trading. The research has tested trading strategies based on the trades of registered insiders during normal transactions as well as tracking the returns of insiders prior to various events. Very little specific research has been done on the defense industries, however.

Previous research seems to have focused on registered insiders. The defense contracting process is very complex and represents a much larger group of participants than the few regulated insiders that would be associated with a single corporation. Therefore the opportunity to benefit from non-public information is greater.

C. OBJECTIVE

The primary objective of the thesis is to examine the stock trading prior to the contract award to determine if any irregular activity is caused by trading on inside information.

Secondary objectives are to establish possible explanations for the irregularity along with any ethical or material concerns.

D. RESEARCH QUESTION AND HYPOTHESIS

1. Primary Research Question

Do defense industry non-registered insiders appear to be trading on non-public information to earn above average returns based on contract awards?

The primary research question investigated in this thesis can be restated as the following research hypothesis:

Defense industry insiders trade on non-public information to earn above average returns based on contract awards.

The hypothesis can also be stated as the following equation:

$$H_0: R_j > R_m$$

$$H_{a_1}: R_j = R_m$$

Where:

R_j = rate of return on security j .

R_m = rate of return on S&P 500 index.

2. Subsidiary Research Questions

- a. Does the company stock trading leading up to the contract have significant price changes?
- b. Is there a readily available explanation to explain any significant price change?
- c. What ethical and material concerns are there in relation to the increased trading with non-public information?

E. SCOPE OF THESIS

The thesis will examine four companies involved in defense contract awards in 1993. The companies to be examined consist of the following:

1. Avondale Industries
2. Foundation Health
3. Aetna Life and Casualty
4. Tadiran

The thesis will look for any irregular activity in the stocks of these companies leading up to the contract award. The investigation of recent data will help capture the financial atmosphere surrounding the companies at the time of the award and provide current results which can be used by interested parties.

Within the context of this thesis, insiders will be defined as those who have access to the non-public information of the contract award. Registered insiders will be the term used for the insiders employed by the firm with ten percent or higher shareholdings.

F. METHODOLOGY

The methodology that was followed was partially obtained from two previous insider trading studies. The first Moss (1986), looked at a variety of issues regarding insider trading around corporate announcements including government contract awards. The second, Czech (1989), looked at the trading of registered insiders in and around defense contract awards within the defense industry between 1980 and 1987.

Additionally, a literature search was conducted on all insider related research done within the last 30 years.

Fiscal year 1993 defense contract awards were screened using the Wall Street Journal Index along with various issues of Defense News. Companies were selected based on being publicly traded and having a contract award or loss representing at least 15 percent of prior year revenue.

The firm's stock price data for the 30 days leading up to the contract award was closely scrutinized. The analysis focused on any abnormal price change using the Capital Asset Pricing Model as the measuring tool. (Jacob and Pettit, 1984, p. 321)

If abnormal returns exist, all news related items will be investigated to find possible explanations. After thorough research is accomplished, conclusions will be developed to explain possible causes for the abnormal returns including trading based on inside information.

G. ORGANIZATION OF STUDY

This thesis consists of six chapters. Chapter II provides the background of insider trading within the defense industry and also an overview of insider trading in general. It provides a defense industry overview and additionally looks at the Efficient Market Hypothesis and the Securities and Exchange Commission responsibilities.

Chapter III discusses the insider related issues derived from the literature review. Chapter IV discusses the methodology used to gather the data.

Chapter V presents and analyzes the data for each of the companies along with providing conclusions specific to each firm.

Chapter VI provides a summary of the research effort. Resultant conclusions are stated and recommendations, concerning the use of the research data, are made. Finally, a list of areas for further research is provided.

II. HISTORICAL PERSPECTIVE

A. INTRODUCTION

Insider trading is a critical issue in the market today. The market's mechanics can be and are affected by insiders in various ways. Investors want markets that are reliable and fairly reflect the market value of securities available for investment. When there is important information that is non-public, security prices will not reflect the true value of all information known. This will lead to mispricing of securities and the probability of some investors profiting over others due to having this privileged inside information.

An important aspect of this thesis relates to the differences between government and corporate announcements. In ordinary corporate announcements, the directors, officers, and others will most likely be aware of important news and because of this, there may be increased insider trading. In government contract awards, the only people who know of the selected contractor are members of the source selection team, congressional committee members and staff, and others in the formal approving chain of command.

B. INSIDER TRADING AND THE SECURITIES AND EXCHANGE COMMISSION

The Securities and Exchange Act of 1934 defined a registered insider as, "any officer, director, or person who owns

more than 10% of a registered company." Some of the rules from this act pertaining to this thesis are covered below.

1. SEC Rule 16a Insider Report Filing

Rule 16a requires insiders to file an initial report with the Securities and Exchange Commission (SEC) and must file a report in any month where there are any changes in their security holdings (Skousen, 1987, pp. 19-27) These reports are published by the SEC in their Official Summary of Security Transactions and Holdings Publication. Researcher's use this publication extensively and it is available to the general public. The insider must report any transaction within 10 days of the month in which the securities were transacted. The SEC reported that up to 45% of insider filings to the SEC were late. (Czech, 1989, p. 22)

2. SEC Rule 16b Short Term Sale Recoupment

Rule 16b allows a corporation to recover gains on short term sales of stocks by insiders. A short term sale is a holding period of less than six months. This provides a mechanism for the SEC and corporations to deter frequent short term transactions by insiders trying to take advantage of non-public information.

3. SEC Rule 10-5b Inside Information Disclosure

Rule 10-5b aids the SEC in prosecuting insiders by prohibiting "any person from engaging in security transactions on the basis of inside information without prior disclosure."

This rule applies to all persons; not just registered insiders. These three rules facilitate the SEC in prohibiting illegal security transactions.

In 1984, the Insider Trading Sanctions Act of 1984 was passed increasing the penalties for illegal insider trading. It provided the SEC with the ability to triple the fines on insiders and also increased criminal penalties from \$10,000 to \$100,000. However, the legislation still did not define "material inside information" or who an insider was (Skousen, 1987, p. 35).

In November of 1988, President Reagan signed into law, the latest bill to curb insider trading. This bill substantially increases the criminal penalties associated with insider trading and provides for a maximum prison sentence of ten years (Staff, 1988, p. A3). Additionally, the bill also set up a bounty reward program for informants and also gave investors in the market at the time of the illegal insider trading, the right to take legal action against the insiders.

Though insider trading is not defined legally, regulators utilize a concept that has developed over time based on court decisions (Solodar, 1987, p. 24). This concept consists of four main parts. The first part states insider trading must involve advance, non-public information. Secondly, the information used must provide profits to the insider through the trading of securities. Thirdly, the insider can either be the one who learned first-hand of the

information or the insider could be the tippee (a person finding out information from an inside person). Finally, cases involving insider trading result in a compromise of fiduciary responsibility (Solodar, 1987, p. 24). These parts form the ingredients for insider trading.

C. INSIDER TRADING OVERVIEW

Insider trading has been around as long as financial markets have existed. Mark Stevens (1987, p. 219) in his book, The Insiders, states:

The truth is that although the Stock Exchanges, the SEC, and the assorted watchdogs of the securities market prefer to play this down, insider trading is a game for the masses. Insiders at all levels aspire to play; many who have the opportunity do. Unlike robbing a bank or stealing a car, insider, trading is not generally viewed as a crime.

Insiders range from secretaries, taxi-cab drivers, and printers to the most prestigious of arbitrators, such as Ivan Boesky (Russell, 1986, p. 71).

There are many views on whether insider trading is a detriment to the marketplace. Young (1985, p. 180) argues that insider trading is beneficial to the market and investors. He supports arguments made by Henry Manne, a strong critic of SEC regulations for many years. One argument suggests insider trading promotes "entrepreneurial" activity and is a way of compensating entrepreneurs. Another argument proposes that insider trading makes the market more efficient by impacting stock prices as early as possible. Therefore, stock prices would fully reflect the value of all possible

information. Young also suggests non-insiders can protect themselves from insiders by buying and holding securities for the long term thus reducing insider profits. (Young, 1985, p. 181)

The main opposition to insider trading focuses on the impact to the investing public and the ability of the market to raise capital for business. Everyone who invests wants equal opportunity in the marketplace.

Huss-Leete (1988. p. 5) argue that the integrity of the market is at risk unless insiders, found to be illegally using, inside information for profit, are appropriately dealt with. They believe there is a greater risk to the financial system if action is not taken immediately.

There is a fundamental concern for market integrity when dealing with insider trading. Arthur Levitt, Jr., Former Chairman of the American Stock Exchange states, "If the investor thinks he's not getting a fair shake, he's not going to invest, and that is going to hurt capital in the long run." (Laderman, Glaberson, Marcial, Phillippe, Frank, 1985, p. 79)

Ludman (1986, p. 120) defends the regulation of insider trading based on both ethical and economic consequences. Ludman agrees with the SEC that insider trading is so close to "fraud" that monitoring should be continued. (Ludman, 1986, p. 121) He cites the jeopardizing of market liquidity and confidence as plenty support for continued regulation.

Douglas (1988, p. 129) demonstrated that damage does occur in both good news and bad news situations. His argument states the uninformed shareholder suffers when trading with the insider who profits from their inside information. Douglas argues this damage justifies the enforcement of insider trading regulations. Douglas seeks "immediate disclosure" as opposed to insider trading. Immediate disclosure would provide instant access to the investing public to the fact that insiders are involved in the trading of the stock. In conclusion, Douglas states:

These uniformed stockholders have a clear right to the information monopolized by insiders because the information is generated with corporate funds. Insiders have no special claim to the information because they have not incurred any cost in generating it (Douglass, 1988, p. 137).

While there are many views regarding insider trading available, the general consensus appear to support that trading on inside information is a detriment to the marketplace.

D. DEFENSE INDUSTRY OVERVIEW

The defense industry has a complex structure and unique relationship to its markets. The industry has a small number of firms most of which depend on the United States Government for a large percentage of their sales. Winning a major contract award determines the firms' future profitability and stability and insiders would be inclined to watch these developments very closely as large government contracts are

not as common as they once were. (Burnett, 1987, p. 29). The complexity of the defense department can be seen in the following quote.

The Department of Defense is the largest and most complex organization in the world, employing more than three million people, operating more than 5,600 installations around the world, and executing more than 15 million contracts per year with some 300,000 contractors. (Preston, 1986, p. 1).

By any measure, the Department of Defense is big business.

Defense contractors experience different risks than those of companies dealing largely with the corporate sector. Additional risk and instability is present due to dependence of the firm on Federal budgets and the whims of the President and Congress. Defense programs and weapon systems can be cut with very little notice often crippling the defense contractors and subcontractor associated with the program. Clearly, many defense contractors rely on the defense industry with defense sales accounting for a majority of their total business.

Reductions in the defense budget, program cancellations or severe curtailment can play havoc with a defense company's future. Due to the volatility in the industry, the defense contractor's stability and profitability from year to year can be less predictable than the average company.

Due to the nature and complexity of the industry, there are many chances for taking advantage of insider information. Often the privileged information is of enormous magnitude due to the large size and concentration of many of the defense

contracts. The high dependence of defense companies maintaining and getting new contracts increases the value of information regarding the contract awards.

E. OVERVIEW OF THE EFFICIENT MARKET HYPOTHESIS

The Efficient Market Hypothesis is fundamental to an insider trading analysis. The following paragraphs summarize this widely discussed theory.

Insider trading and the processing of information is central to the theory of efficient capital markets. (Czech, 1989, p. 12) Eugene Fama (1970, p. 383) states, "A market in which prices always 'fully reflect' available information is called efficient." This is known as the Efficient Market Hypothesis (EMH). Fama further delineates this theory into three levels of efficiency. They are covered below.

1. Weak Form

Fama (1970, p. 387) describes the first level as the "weak-form" wherein security prices reflect all past, historical data. This basically means that no investor can create a profitable trading rule based on past information as this information is already impounded in the security price. Most of the research support the weak-form of the Efficient Market Hypothesis.

2. Semi-Strong Form

The second level, "semi-strong form," states that all past and public information is adjusted for in security prices. This means that public announcements by corporations

(i.e., earnings or dividend announcements) are quickly impounded into the security price and consequently, abnormal profits cannot be made. The research studies on the semi-strong form of the Efficient Market Hypothesis have, for the most part, supported the market at this efficiency level (Fama, 1970, p. 409).

3. Strong Form

The last and third level of this theory is referred to as the "strong-form." This level states that stock prices fully reflect all information known, public, private, and historical (Fama, 1970, p. 383). This essentially means that no investor has information over which he or she can make abnormal profits in the market as the security prices reflect this information instantaneously.

III. LITERATURE REVIEW

A. INTRODUCTION

There has been a fair amount of research done on insider trading and related area over the years. Most of the research has focused on the strong-form efficient market hypothesis to analyze whether or not insiders consistently realize abnormal profits.

One of the problems in researching the strong-form market hypothesis is that inside information itself is unobservable. Therefore, different methods must be used. One of the more popular methods is to examine returns and trading volume prior to public announcements (Dyckman & Morse, 1986, p. 40). Price and volume movement in the underlying stock can sometimes demonstrate behavior consistent with insider trading.

B. DEFENSE RELATED STUDIES

A very similar thesis on insider trading within the defense industry was done by Czech (1989). This study looked at insider trading done within the defense industry between 1980 and 1987. The authors looked at the stock price and volume activity surrounding a contract award announcement. Only trade's by "registered" insiders were analyzed. Additionally, the study focused on the industry as a whole rather than each individual contract award. The conclusion of the thesis was that only on Day "0" or the day of the public

award announcement were there statistically significant abnormal returns and abnormal trading volume and hence insider trading if done was not detected. (Czech, 1989, p. 106). The work generally supported semi-strong form market efficiency.

Blunt (1988) studied the effects of political and military events on the prices of defense stocks. Blunt found that certain military and political events did in fact produce abnormal returns in the defense portfolio of stocks examined (Czech, 1989, p. 10).

Moss (1986) looked at a variety of issues regarding insider trading around major public corporate announcements. One of the items researched was government contract awards. Moss did not define them as "defense contracts," so it is unclear as to the direct relation to the defense industry. The study found that insiders earned abnormal returns from purchases prior to the announcement of these favorable awards and also reduced their losses on those trades prior to bad news.

C. STRONG-FORM MARKET EFFICIENCY STUDIES

Lorie and Niederhoffer (1968, p. 35) did a comprehensive study on the stock trading of insiders and its information content for outsiders. The authors provided some of the first evidence that "proper and prompt analysis of data on insider trading can be profitable."

They looked at several insider trading properties to determine their validity. Two of the properties analyzed were

whether or not 1) insiders had superior ability to forecast significant price changes in their own stock, and 2) intensive buying or selling of stock by insiders indicated stock performance six months later (intensive buying/selling event requires have at least two more buyers than sellers and vice versa).

After statistically analyzing insider stock transactions before a major change (considered to be 8% or more), the authors found "the odds in favor of a large increase were 2.5 to 1 after an insider purchase and 1.1 to 1 after a sale" (Lorie and Niederhoffer, 1968, p. 47). Other analyses provide similar support that insiders can successfully predict large price changes in their stocks.

Lorie and Niederhoffer also found when insiders do trade extensively, the subsequent outcome will approximate the trading (i.e.: if intensive buying, the stock price should increase, and the stock price should decrease for intensive selling) (Lorie and Niederhoffer, 1968, p. 51).

Pratt & DeVere did a massive review of 52,000 insider transactions of 800 firms traded on the NYSE between 1960-1966. The authors computed the "investment performance" of both buy and sell groups. A buy group was considered to have at least three insiders buying and no insiders selling and vice-versa for the sell group." The average rate of return for the buy group was 27.1% after 12 months and 9.6% for the sell group (Pratt & DeVere, 1968, p. 272).

Finnerty (1976, p. 1141) studied "the average insider" which included any company in which an insider traded. He concluded that insiders do make above average returns when purchasing stock of their own companies and are also able to reduce their losses when selling the stock (Finnerty, 1976, p. 1146).

Keown and Pinkerton (1981, p. 857) looked at insider trading around merger and takeover announcements. The authors studied insiders other than "registered insiders" to determine the activity levels of this group with reference to merger events.

The sample consisted of 194 successfully acquired firms of which 101 were listed on the New York Stock Exchange and 93 in the Over the Counter Market. The period of announcements ranged from 1975 through 1978. Utilizing the market model and daily stock prices, Keown and Pinkerton calculated both daily and cumulative average residuals (CAR). The results of Keown and Pinkerton's study revealed the CAR became positive 25 days prior to the public announcement date and the daily average residuals were positive 26 out of 27 days prior to this announcement (Keown and Pinkerton, 1981, p. 860). The authors conclude the preponderance of insider trading prior to the official public announcement date. Analyzing the increased trading volume that was present, Keown and Pinkerton state:

In fact, 76% of the firms studied experienced no open market purchases or sales by registered insiders during the month prior to the announcement date.... Thus the

frantic trading that occurred prior to the merger announcement was not caused by registered insiders for whom trades during this period would attract unwanted attention (Keown and Pinkerton, 1981, p. 863).

Keown and Pinkerton conclude registered insiders are not responsible for the large increase in trading volume prior to these announcements.

IV. METHODOLOGY

A. INTRODUCTION

The chapter is divided into three sections. In the first section, the test procedure is presented. The second section provides a detailed description of the data. Finally, the third section presents the capital asset pricing model.

B. TEST PROCEDURE

The thesis will look at the stock price data from the companies selected for the 30 days leading up to the contract award. The average change in the price of the stock during this 30-day period will be compared with the return of the Standard and Poor's 500 Market Index for the same period. Since the primary objective of this thesis is to determine if insiders, presumed to be acting on the knowledge of nonpublic information, are able to outperform the market, it was not necessary to examine returns after the announcement effect was complete. To investigate returns after the announcement effect is exhausted would permit the influence of other company and economic developments to cloud the results. The isolation of excess returns (or lack of excess returns) produced as a result of trading on the basis of inside information should refute (or lend support to) the strong form efficient market hypothesis.

The insider's returns were adjusted for risk using beta coefficients and compared with returns for the S&P 500 market index via the capital asset pricing model. The magnitude of the residual return (the excess return after adjustment for risk over the return on the market index) should indicate whether or not an insider was able to outperform the market (after adjustments for risk).

Annualized returns were computed in the following manner:

$$R_j = \frac{P_t - P_o}{P_o} \times \frac{360}{t}; \quad (4.1)$$

$$R_m = \frac{M_t - M_o}{M_o} \times \frac{360}{t}; \quad (4.2)$$

Where:

t = the number of days from the date of purchase or sale to the day for which the return is to be computed;

R_m = the equivalent annual return on the market index;

R_j = the equivalent annual return on security i after t days;

P_o = the security price at 30 days prior to announcement;

P_t = the security price after 30 days;

M_o = the market index at 30 days prior to announcement;

M_t = the market index after 30 days.

This methodology enables returns over differing holding periods to be standardized at an equivalent rate of return. The annualized return for each transaction was computed for

the 30 days leading up to the announcement as well as an annualized return for the market during the same period.

As Jensen has indicated in a previous study, the capital asset pricing model can be revised into the following regression (Jensen, 1968, pp. 398-416):

$$R_j - i = A_j + (\text{Beta}) (R_m - i) + U_j \quad (4.3)$$

where:

A_j = the excess return by the insider above the return on the market

U_j = the error term with an expected value equal to zero

Table 4-1 shows the data used in a sample calculation of returns. The table is followed by an illustration of the precise manner in which return calculations were performed.

TABLE 4-1
EXAMPLE OF RETURN CALCULATIONS IN THE STUDY

Day	t	Price	Index	Beta	i
30 Days Prior to Announcement	-31	50.00	130.00	1.5	.10
Day Prior to Announcement	-1	52.00	132.60		

$$R_j = \frac{52-50}{50} \times \frac{360}{15} = 0.96$$

$$R_m = \frac{132.6 - 130.0}{130.0} \times \frac{360}{15} = 0.48$$

Assume there were two other insider transactions with returns of .92 and 1.00 while the market return was .44 and .52 over the same time periods. The average return on the security would be .96 and the average market return would be .48. The excess return on the insiders' transactions could then be calculated as follows:

$$.96 - .10 = A_j + (.48 - .10) (1.5) + 0$$

$$.86 = A_j + .57$$

$$A_j = .29$$

The return on the stock is 96 percent while the return on the market is 48 percent. After the stock is adjusted for risk the excess return is 29 percent. The excess return was then tested to determine if it was statistically significant from zero. Any value of A_j significantly different from zero is an indicator of excess returns since A_j should be zero in an efficient market, i.e., a random selection of stocks can be expected to result in a zero intercept using Jensen's methodology shown above. If insiders are able to use private information and forecast security price changes, the intercept should be significantly different from zero. The paired differences test was used to test for significance at the ninety five percent level of confidence.

If abnormal returns are found, other possible causes for the abnormal returns will be investigated. The following represents other possible causes to be examined:

1. All news during the period.
2. Any registered insider transactions.
3. Brokerage House rating or earning estimate changes.
4. Other related companies stock movement.
5. Earning announcements.

Any reasonable explanation for abnormal movement will be sought out. If no rational explanation can be found, then the stock award information flow process will be examined for the possibility of trading or inside information.

C. STOCK PRICE DATA

The stock price and volume data for the stock sample was taken from the online Dow Jones Historical Stock Quote Reporter Service of the online Dow Jones News Retrieval Service. The price and volume data were looked at for the 90 days leading up to the contract award.

The Wall Street Journal Index was researched for companies that were awarded defense contracts. The companies were selected based on the award size impacting revenue by at least 15%. This made the contract award very material to the company. The companies selected were chosen at random from a sample of companies meeting the above requirements.

Corporate historical betas used in the capital asset pricing model were taken from Reality's Smart Investor Online Software Program. This service provides historical betas as well as other fundamental information on over 5000 publicly

traded corporations. The betas used for this study were calculated to be effective as of June 1993.

D. CAPITAL ASSET PRICING MODEL

The capital asset pricing model was originally developed by William F. Sharpe in 1964 and independently by John Lintner in 1965. Many generalizations of the theory were made after its introduction. However, the most significant was made by Jan Mossin in 1966. For these reasons, the theory is often called the Sharpe-Lintner-Mossin Capital Asset Pricing Model (Jacob and Pettit, 1984, p. 321). The model provides a simple, but powerful, description of the relationship between risk and return in an efficient market. It also serves as the basis for a number of current practices in the investment industry.

Although other theories attempt to do the same thing, the capital asset pricing model is especially useful for two reasons. First, since the model is relatively simple and intuitive, it can easily be applied. Second, its implications have been researched extensively using empirical data and found to be substantially consistent with most of the theory's predictions. While the theory does not always predict correctly, its implications generally conform to what is observed in security markets. (Sharpe, 1985, pp. 146-179)

The important assumptions in the capital asset pricing model are summarized as follows: (Jacob and Pettit, pp. 321-358)

1. No transactions costs or taxes are included.
2. Investors may hold fractional shares of individual stocks.
3. All investors are price takers.
4. A single investment period in an uncertain world.
5. Investors make decisions on the basis of portfolio expected returns and standard deviations of returns.
6. Expectations are homogeneous.
7. A risk-free asset exists, available to all for borrowing or lending.

The capital asset pricing model is expressed as follows:

$$E(R_j) = i + [E(R_m) - i] [\text{Beta}] \quad (4.4)$$

where:

$E(R_j)$ = the expected rate of return on security j ;

i = the risk free rate of return;

$E(R_m)$ = the expected return on the market index;

Beta = the beta coefficient for security j .

The risk free rate of return refers to the interest rate on securities that are free of default risk. The most appropriate choice of a risk free asset is a U.S. Treasury security, since government securities are perhaps the safest of all possible investments. The maturity of the Treasury security used should be approximately the same as the investor's holding period. If an investor has a five year holding period, the rate on a five year Treasury security should be used as the risk free rate of return. (Gup, 1984, p. 134) The risk free rate of return used in this study was the average rate of return on new issues of 90-day Treasury

bills taken within the month of the announcement. These rates are readily available from the Dow Jones News Retrieval Service. A list of the rates are shown in Appendix A.

The Standard and Poor's 500 Stock Index was used as a proxy for the market portfolio. The index includes 400 industrial, 40 public utility, 20 transportation, and 40 financial companies. The index was assigned a value of 10 for the base period of 1941-43. (Gup, 1984, p. 145) Therefore, if the Standard and Poor's 500 Stock Index were 150 today, the value of the 500 stocks would be 15 times greater than it was during the 1941-43 base period. Values for the Standard and Poor's 500 Index that were used in this thesis were taken from the online Dow Jones Historical Stock Quote Reporter Service.

The beta coefficient is a measure of the volatility in the return of an asset relative to a market portfolio of assets. In theory, the market portfolio consists of all risky assets that are available to investors. In practice, however, a large portfolio of common stocks, such as the Standard and Poor's 500, is often used to represent the market portfolio. (Jacob and Pettit, 1985, p. 326)

Beta is a commonly used measure of systematic risk, i.e., risk that is common to all stocks in the market. This is the risk that is due to inflation or changes in general business conditions that affect all stocks in the market. The beta for the market is always 1.00. The beta for an individual security is usually measured by comparing the variations in

returns of the security to the returns on the market portfolio. The calculated beta coefficient may then be used as an aid to investors to determine the expected rate of return. A beta of greater than 1.00 suggests that, on average, the returns of an asset are more volatile, more risky, and likely to produce a greater return than the market portfolio when the market increases. If, for instance, a stock has a beta of 1.30, the stock can be expected, on average, to increase 30 percent more than the market portfolio when the market increases. The opposite occurs when the market goes down. Stocks with beta's greater than 1.00 are called "aggressive" securities. (Gup, 1984, p. 134)

In contrast, a beta less than 1.00 implies that the returns on a stock are less volatile, less risky, and will produce, on average, less return than the market portfolio. Stocks with betas less than 1.00 are called "defensive" securities. A beta of zero means that a security's returns are not subject to systematic risk. (Gup, 1984, p. 134) The following example (using ex post data) shows how the rate of return is calculated for a stock with a beta of 1.30 when the risk free rate is 10 percent and the market return is 25 percent.

$$\begin{aligned} R_j &= i + (R_m - i) \text{ (Beta)} \\ &= .10 + (.25 - .10) (1.30) \\ &= .295 \end{aligned}$$

Therefore, the return on stock j, under the conditions stated above, is 29.5 percent.

V. FINDINGS

A. INTRODUCTION

Using the methodology discussed in the previous chapter, the hypothesis stated in Chapter I was tested. This chapter reports the results of the tests for each company analyzed. The thesis attempted to capture the financial atmosphere during the time surrounding the contract award by reviewing all available news and stock price information.

When stating the hypothesis it was expected that insiders could outperform the market if they bought or sold their company's stock prior to a favorable (unfavorable) contract announcement by the company. The hypothesis is restated as follows:

$$H_0: R_j > R_m$$

$$H_a: R_j = R_m$$

Where:

R_j = rate of return on security;

R_m = rate of return on the S&P 500 index.

This chapter is divided into four sections with each section looking at a specific company. Each section is broken down into two subsections. The first subsection presents and analyzes the data, questioning all possible explanations for abnormalities within the data. The second subsection provides conclusions from the analysis.

B. AVONDALE INDUSTRIES

1. Data Presentation/Analysis

On September 2, 1993 at 6:14 p.m. the company was awarded an initial \$265 million contract by the U.S. Navy for construction of one strategic sealift ship. The contract also contained options for another five ships that would raise the overall value of the contract to \$1.3 billion through 2001. The shipbuilding orders were badly needed for Avondale which had seen its backlog shrink to only 18 months as overall sales slid from \$777 million in 1991 to \$592 million in 1992. (Holzer, 1993, p. 4)

The importance of the contract is readily apparent in that the \$265 million award represented 45% of 1992 total sales. It could be expected that the price of the stock would be trending higher in the 30 days prior to the announcement if individuals were taking advantage of the non-public information regarding the contract.

Figure 5-1 summarizes the individual stock price data along with the S&P 500 index during the 30 days leading up to the contract announcement. From the price data in Figure 5-1 it is evident that Avondale did not produce an abnormal return for the 30 days leading up to the award. The stock actually earned a negative 2.703% return during the period versus 2.444% for S&P 500. There was no published news or situation

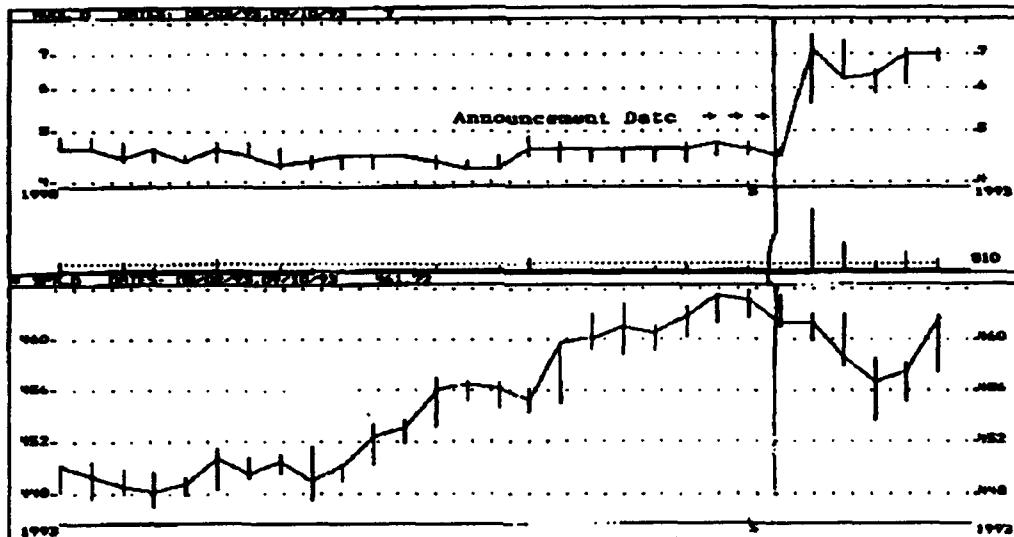


Figure 5-1
Avondale vs. S&P 500

of any type during the time leading up to the award that might have negatively effected the stock which might have hidden insider buying during the period. Since the data refutes the hypothesis that abnormal returns were achieved on the basis of insider information, it was not necessary to address the subsidiary questions addressed in the thesis.

One interesting note that accompanies the data as seen vividly in Figure 5-1 is that the stock price went up 58.3% to 7 1/8 the day following the announcement which had been made at 6:17 p.m. This price movement illustrates the importance of the contract award.

2. Conclusions

As stated earlier, there was no abnormal return in Avondale's stock during the thirty days prior to the contract

award. The lack of movement by the stock prior to the announcement of a contract with such magnitude to the company would lend support to the semi-strong form market hypothesis. Recall, the semi-strong form hypothesis states that all past and public information is adjusted for in security prices and that public announcements are quickly impounded into the security price, eliminating any abnormal profits from the information.

The data seems to support that the information flow within this contract award process appear to be sound with no apparent leakage.

C. FOUNDATION HEALTH

1. Data Presentation/Analysis

On July 29, 1993 at 7:33 a.m. the company reported that its government contract unit, Foundation Health Federal Services Inc., had been notified by the Department of Defense that it was not selected to continue as the contractor for the follow-on CHAMPUS Reform Initiative program in California and Hawaii. The contract was for medical care management for 840,000 military retirees and their dependents in California and Hawaii. The contract accounts for 45 percent of Foundation's \$1.5 billion in revenue and a comparable amount of its 61.9 million in profits. (Barnum, 1993, p. D1)

In view of the extremely negative news, the stock price would have been in a downward trend if information leakage on the contract award was taking place. Figure 5-2

summarizes the individual stock price data along with the S&P 500 index data during the 30 days leading up to the contract announcement.

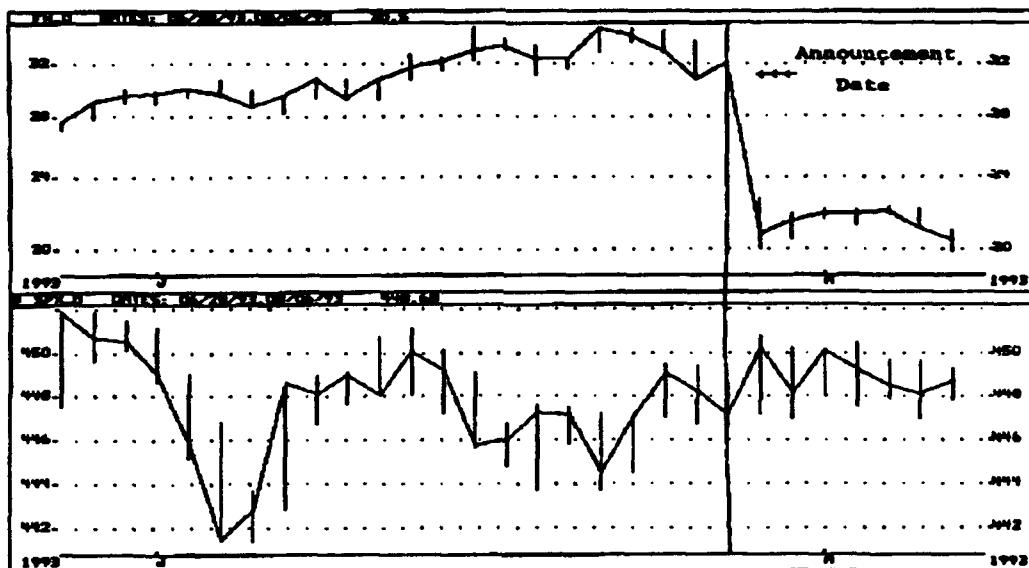


Figure 5-2
Foundation Health vs. S&P 500

The price of the stock was trending upward when information leakage would dictate a negative bias especially during a slight decline in the market during this period. Once again, abnormal returns were nowhere to be found in the thirty days prior to the loss of the contract. Although one interesting piece of information did come out in the course of research. Several of the registered insider's of the company sold amounts of their stock in May, only two months prior to the loss of the contract.

Kurt Davis, Director of Investor Relations at Foundation Health, said the Foundation officers sold stock in recent months because it was their first opportunity to do so since August 1992 and because they believed that the window of opportunity to sell shares would soon be closed again.

When negotiations began on the acquisition of California Compensation Insurance Co. of Novato last year, Foundation officers were constrained from selling because they had inside information about the deal, Davis said.

Only when the deal became public on April 12, did the officers have a chance to sell. And because of "the way this company was growing with acquisitions, it was hard to tell" when the window of opportunity to sell stock would be closed again, Davis said. (Barnum, 1993, p. D1)

On the day of the announcement as seen in Figure 5-2, the stock of the company plunged 35 percent. Again, the price movement of the stock illustrated the importance of the loss of the contract in the market evaluation of the company.

2. Conclusion

Abnormal returns were not found within the data. The explanation from investor relations at Foundation Health regarding the selling of stock by registered insider's seems reasonable and adequate justification. The analysis of the data seems to support the semi-strong market hypothesis.

D. AETNA LIFE & CASUALTY

1. Data Presentation/Analysis

On July 29, 1993 at 7:33 a.m. the company was awarded a \$3.5 billion contract for providing health care to about 800,000 military retirees and dependents in California and Hawaii in the CHAMPUS Reform Initiative program. (McCoy, 1993, p. A1)

The contract would represent 20.59 percent of the nearly \$17 billion in revenue for the company in the last 12 months ending June 30, 1993.

A positive trend in the stock price would be expected in the days leading up to the contract award if individuals were taking advantage of the non-public information regarding the contract. Table 5-1 summarizes the individual stock price data along with the S&P 500 index data during the 30 days leading up to the contract announcement.

TABLE 5-1
STOCK PRICE DATA FOR AETNA AND S&P 500 INDEX

	30 Day Prior Price	Prior Day Price	Net Change
Aetna	55 3/4	57 3/4	3.587%
S&P 500 Index	451.85	447.19	-1.031%

Using the capital asset pricing model with the risk free 90-day T-Bill rate being 3 percent and a beta coefficient for Aetna of 1.26, a risk adjusted return for Aetna was

computed to be 4.951 percent versus the S&P 500 index. This is a significant return which would indicate some abnormality. Thus, further research was done to find possible causes for the abnormality. The following computations illustrate the calculation of the risk adjusted return.

Recall the following formulas for the capital asset pricing model:

$$R_j = \frac{P_t - P_o}{P_o}$$

$$R_m = \frac{M_t - M_o}{M_o}$$

$$R_j = A_j + (\text{Beta}) (R_m - i) + U;$$

Where:

t = the number of days from the date of purchase or sale to the day for which the return is to be computed;

R_m = the equivalent return on the market index;

R_j = the equivalent annual return on security i after t days;

P_o = the security price at 30 days prior to announcement;

P_t = the security price after 30 days;

M_o = the market index at 30 days prior to announcement;

M_t = the market index after 30 days;

A_j = the excess return by the insider above the return on the market;

U_j = the error term with an expected value equal to zero.

$$R_j = \frac{57.75 - 55.75}{55.75} = 3.587$$

$$R_m = \frac{447.19 - 451.85}{451.85} = -1.031$$

$$3.587 - .250 = A_j + 1.26 (-1.031 - .250) \text{ to}$$
$$A_j = 4.951$$

News reports were analyzed during the timeframe of the award. One of the news items during the period was the quarterly earnings announcement. Two days following the contract award Aetna reported second quarter 1993 results of a profit of \$1.32 versus a loss of \$.41 for the second quarter 1992. This was an outstanding report and was a surprise to Wall Street. Institutional Brokerage Estimate Service (IBES) had a mean estimate of \$1.09 for the quarter. IBES is a service which pools earnings estimates of equity analysts from over 60 brokerage houses which operate on Wall Street.

The actual earnings report was 21.1 percent higher than the mean estimate available to the street. The higher than expected earnings report could certainly be categorized as a positive surprise in the results of the company.

The last research indicator used was the buying and selling by registered insiders. The online Corporate Ownership Watch Service by Invest/Net Inc. on the Dow Jones News Retrieval Online Service was reviewed for all the registered insider transactions for 120 days leading up to the contract

award. No unusual activity was uncovered with only a few insider buys and sells taking place which were small and offset each other.

Unlike the previous two companies, the price of the stock of Aetna as seen in Figure 5-3, did not rise significantly after the announcement of the contract award. It rose only 3.9 percent from 57 3/4 to 60 and hovered around 58 1/2 for the five days following the announcement.

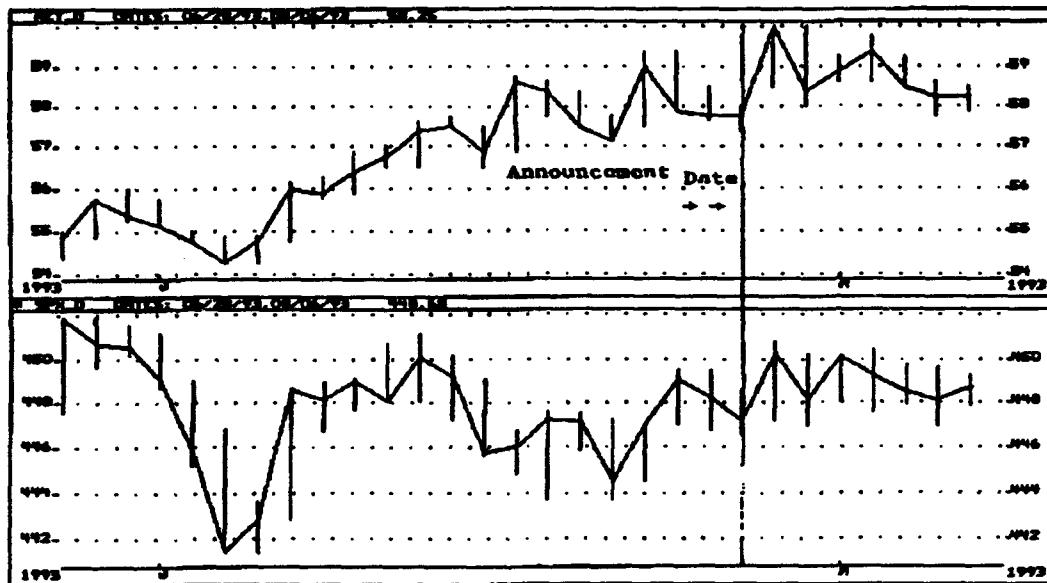


Figure 5-3
Aetna vs. S&P 500

2. Conclusion

There appeared to be some abnormal returns achieved from Aetna during the period which may indicate information leakage. The corresponding above average earning announcement

could significantly effect the results and may prove to be an explanation of the abnormality.

Significant research has been previously conducted, which indicates that when companies report earnings above the consensus estimate of market analysts, their stocks achieve above average returns. (Fosback, 1992, p. 205) Additionally, research also indicates that abnormal returns have been earned from insider purchases prior to higher than expected earnings announcements. (Moss, 1986, p. 104)

From these past studies one could reasonably hypothesize that at least a portion of the abnormal return could be attributed to the higher than expected earnings announcement. It is a well known fact on Wall Street that the price of a stock tends to increase for 2-3 weeks prior to a positive earnings announcement. The street maxim of "Buy the rumor, sell the fact" might very well be true in this case.

Additionally, transaction costs of approximately 2 percent on both the buy and sale side would almost offset any abnormal returns. Finally, there was no persuasive evidence to support the hypothesis that abnormal returns were being made with inside information on the contract award.

E. TADIRAN LIMITED

1. Data Presentation/Analysis

On September 7, 1993 at 12:21 p.m. the company announced a \$40 M supply pact with U.S. armed forces to supply 10,000 additional SINCGARS tactical communication radios.

Tadiran is an Israeli based telecommunications defense and consumer appliance conglomerate. (Dow Jones News, September 8, 1993) The contract would represent 25.87 percent of current year military sales.

A positive trend in the stock price would be expected in the days leading up to the contract award if information leakage was occurring. Table 5-2 and Figure 5-4 summarize the individual stock price data along with the S&P 500 index data during the 30 days leading up to the contract award.

The excess return achieved by Tadiran in relation to the S&P 500 Index was 26.86 percent. There was no beta coefficient available to adjust the return for risk. The beta was unavailable due to the company being a foreign stock and have only been traded on New York Stock Exchange for a

TABLE 5-2
STOCK PRICE DATA FOR TADIRAN AND S&P 500 INDEX

	30 Day Prior Price	Prior Day Price	Net Change
Tadiran	27.5	35.325	28.636%
S&P 500 Index	448.68	456.65	1.776%

little over a year. This is a significant return which could indicate some abnormality. Thus, further research was done to find possible causes for the abnormality. The calculation of

the return for Tadiran was 28.636% versus 1.776% for the S&P 500 index.

To determine possible causal factors, news reports during the timeframe of the award were reviewed and analyzed. One major news announcement during the time period was the signing of a historic peace agreement between Israel and the Palestine Liberation Organization. Some mutual fund experts predicted that peace in the Middle East could open the door for new funds or for established international funds to add Israeli securities to their portfolios. (Romano, 1993)

Therefore, an investigation of other Israeli stocks was warranted. Figures 5-5, 5-6, and 5-7 illustrate the stock movement of Tadiran, PEC Israel, and the First Israel Fund during the time period of the award.

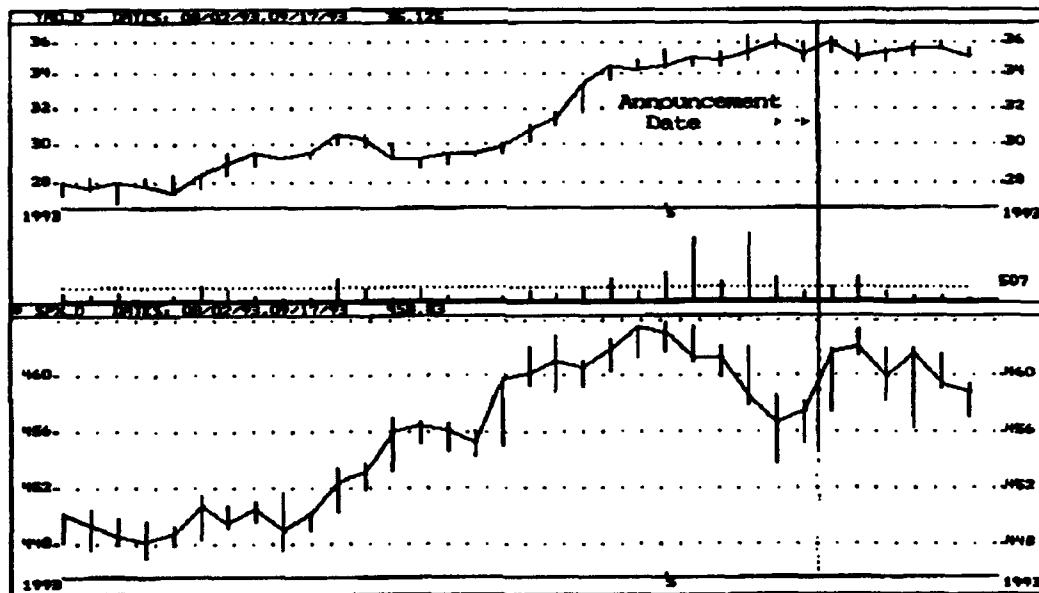


Figure 5-4
Tadiran vs. S&P 500

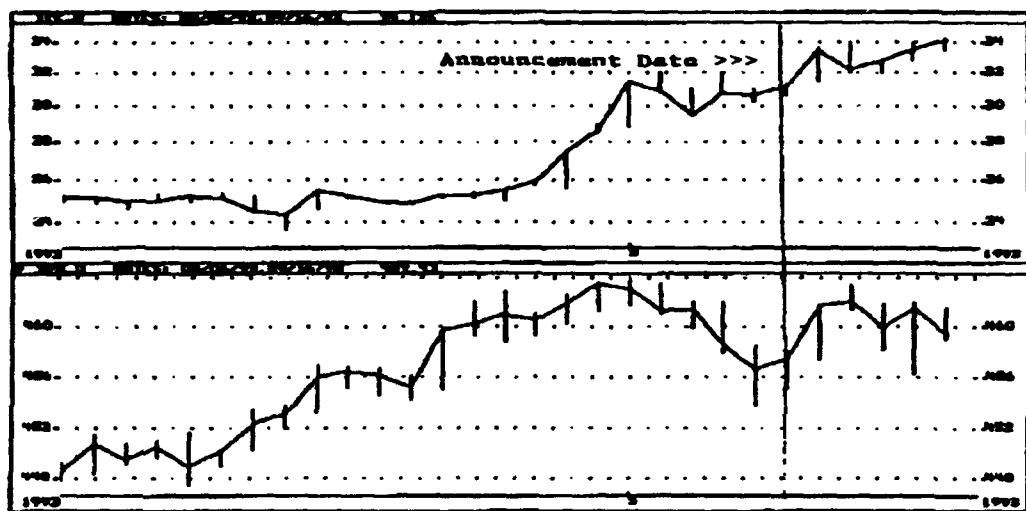


Figure 5-5
PEC Israel vs. S&P 500

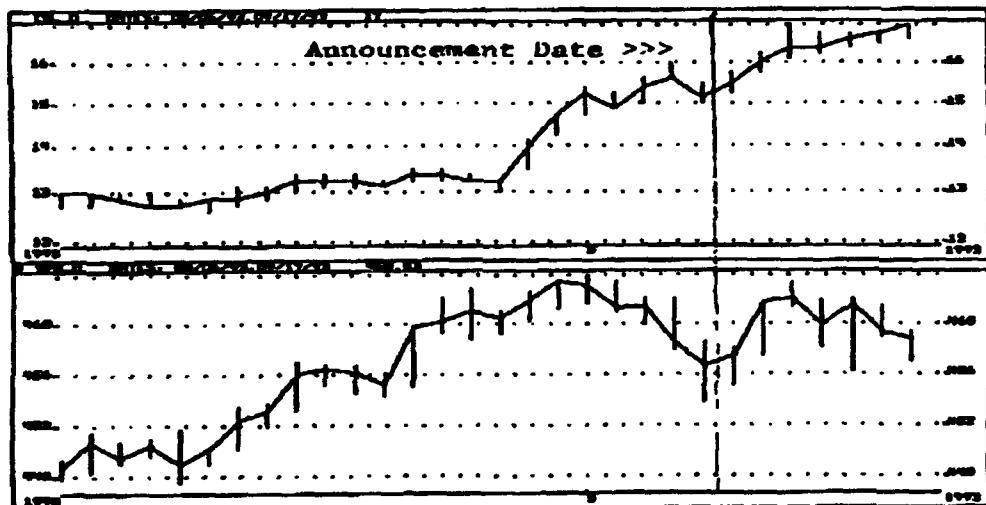


Figure 5-6
First Israel Fund vs. S&P 500

Table 5-3 provides a summary of the figures.

TABLE 5-3
ISRAEL STOCK DATA

	30 Day Prior Price	Prior Day Price	Net Change
PEC Israel Economic Corp.	25.325	30.625	21.9%
First Israel Fund	13.0	15.625	20.192%
Tadiran	27.5	35.325	28.636%
S&P 500 Index	448.68	456.65	1.776%

PEC Israel Economic Corp. is a New York-based holding company with investments in various Israeli industries. First Israel Fund Inc. is a closed-end mutual fund which invests in Israeli companies.

These two stocks provided a good measure of Israel stocks in general due to their diversified investment structure. The lack of an established Israel stock index within the U.S. increases the importance of analyzing the returns of these two stocks.

Table 5-3 identifies that the Israeli stock market was rapidly moving upward during the time of the contract award. This rapid movement in Israeli stocks was the only reasonable explanation found within the research for Tadiran's impressive return during this time period.

2. Conclusion

Tadiran definitely achieved an abnormal return during the time period. The research indicated that this return probably corresponded to the boom in the Israeli stock market during the period as a result of the peace accord. No conclusive evidence could be found which supports that the abnormal returns were the result of information leakage.

VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

The purpose of the thesis was to examine government contractor stock activity prior to contract award announcements to determine if insider inequalities may have occurred. The thesis examined four defense industry companies to determine if insiders trade on non-public information to earn above average returns based on contract awards. Stock price data for the 30 days leading up to the award was closely scrutinized. The analysis included reviewing registered insider transactions, related company stock movement and earnings announcements. All available news data was also analyzed to provide background and any causal relationships to any abnormality.

B. CONCLUSIONS

In this thesis, two of the companies analyzed, Avondale Industries and Foundation Health, operated at the semi-strong form of the market hypothesis. They showed no abnormal returns for the 30 days leading up to the contract award. However, there was a sharp rise in abnormal returns on the date of the announcement with a corresponding increase in the trading volume for that day. The market quickly absorbed this new and reflected the information in the stock price of the firms.

The other two companies analyzed in the thesis, Aetna Life and Casualty and Tadiran, did display some abnormal returns. However, the abnormal returns appeared to be in response to a surprise positive earnings announcement and a strong sector rally rather than directly to the contract award.

From the analysis of the few companies picked, it can be concluded that abnormal returns were not achieved as a result of information leakage in the preceding 30 days leading up to a major defense contract award.

The contract award process within the defense industry appeared to be effective in these cases with no apparent flaws within the information flow. The current regulations regarding trading based on insider information monitored by the Securities and Exchange Commission also seems to be effective.

Therefore, it appeared that the current system is working. Although abnormal returns may be still achieved with inside information on a small scale basis, additional enforcement measures may not be warranted.

The Foundation Health and Aetna examples in this thesis support the conclusion proposed by Czech, where the study found that abnormal returns were not achieved by registered insiders prior to major contract awards. (Czech, 1989, p. 75)

Also the Foundation Health and Aetna examples contradict the work of Moss, where it was found that registered insiders

did achieve abnormal return from trading on inside information prior to contract awards. (Moss, 1986, p. 106)

C. RECOMMENDATIONS

1. It is recommended that when abnormal stock movement prior to contract awards is identified, other possible sources for the movement should be investigated including all available financial news, market news, and political announcements. The investigation should help separate other causal factors from insider trading effects.
2. It is recommended that the methodology used in this thesis be reviewed for applicability to future SEC or Department of Defense investigations into possible illegal trading patterns within the defense industries.
3. The results of this thesis suggest the following areas for further study:
 - a. It is recommended that the methodology of this thesis be expanded to include all defense contract awards representing five percent or more of sales in the last three years. The results from this thesis could then be compared for consistency with a larger population of defense contract awards.

b. It is recommended that a replication of this thesis also be conducted across commercial industries to provide insight as to whether abnormal returns are received by insiders with non-public information on regular contract awards.

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